

SUMMARY OF 1989-90 MW & BC FUNDED RESEARCH PROJECTS AT MSU

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TITLE: Value enhancement of barley through coordinated investigations of factors influencing nutritional qualities and food science applications.

INSTITUTION: Montana State University

DEPARTMENT: Plant & Soil Sciences/Animal & Range Sciences

RESEARCHER: C.W. Newman, C.F. McGuire, R.K. Newman, M.K. Petersen, W. Hudyma

COOPERATORS: T.K. Blake, W.F. Gipp, E.A. Hockett, R.T. Ramage

AMOUNT FUNDED: \$90,000.00

OBJECTIVES:

- 1) To further characterize and develop commercial uses of barley components which are responsible for the health benefits for humans.
 - a) Screen commercially available barley cultivars for their ability to suppress serum cholesterol.
 - b) Study the degree of polymerization (molecular weight) of barley b-glucans as influenced by the amylopectin:amylose ratio (waxy and nonwaxy barleys), the presence or absence of the hull and short and long awns as related to the effect on serum cholesterol and glucose levels.
 - c) Further investigate the oil component (tocotrienol) of barley on the reduction of cholesterol synthesis in the liver of chicks and animals.
 - d) Investigate the relationship of dietary fat (unsaturated and saturated) from different food sources and the dietary fiber of barley on serum and liver cholesterol and lipids.
 - e) Utilization of barley and milled fractions from selected barley cultivars in preparation of foods, coordinating healthful qualities with functional properties to attain acceptable products.
- 2) To evaluate the feed value of barley for livestock and poultry
 - a) Evaluate the effect of varying ratios of

- amylopectin:amylose (waxy and nonwaxy) barleys on the feed value of barley for animals.
- b) Investigate the influence of the proanthcyanidin (ANT) gene(s) on rate of digestion and subsequent feed value of barley for ruminants.
 - c) Evaluate commercially released malt and feed type barley varieties for their potential as feed grains for ruminants.

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TITLE: Development of an RFLP map in barley

INSTITUTION: Montana State University

DEPARTMENT: Plant & Soil Sciences

RESEARCHER: Tom Blake (Leader), Raeann Magyar

AMOUNT FUNDED: \$25,000.00

OBJECTIVES:

Development of a saturated user friendly map which can be used to help breeders develop the best lines for the best region & aid in identification of those lines by producers & consumers.

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TITLE: Development of Barley Cultivars Adapted to Montana

INSTITUTION: Montana State University

DEPARTMENT: Plant & Soil Sciences

RESEARCHER: Tom Blake (Leader), Pat Hensleigh

AMOUNT FUNDED: \$50,000.00

OBJECTIVES:

The objectives for the MSU barley breeding project are:

- 1) To improve the dryland adaptation and quality stability of 2-rowed malting cultivars.

2) Improve straw strength, yeild potential and disease resistance of 2-rowed feed barleys.

3) To continue to develop a non-shattering 6-rowed barley germplasm base.

4) To develop a germplasm base for several classes of special use barley cultivars.

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TITLE: The purchase and use of a remote weather station to obtain information on the influence of weather parameters on dryland small grain production.

INSTITUTION: Montana State University

DEPARTMENT: Eastern Agricultural Research Center/Sidney MT

RESEARCHER: Jerald Bergman (Leader), Joyce Eckhoff

AMOUNT FUNDED: \$4,500.00

OBJECTIVES: To purchase a remote weather station to monitor weather on our dryland research site to provide information on its influence on the management of small grain production

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TITLE: Evaluate different barley genotypes for heir possible resistance to the new disease (barley yellow streak mosaic) of barley

INSTITUTION: Montana State University

DEPARTMENT: Plant Pathology

RESEARCHER: Tom Carroll, S.K. Zaske (Leader), L. Erdahl

AMOUNT FUNDED: \$10,000.00

OBJECTIVES: 1) Evaluate different genotypes of barley for their possible resistance to barley yellow streak mosaic (BYSM). Identify any that show promise as

a source of resistance for future development of resistant malting and/or feed barleys to be grown in Montana.

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TITLE: Response of dryland spring wheat to an application of nitrogen during tillering
INSTITUTION: Montana State University
DEPARTMENT: Eastern Mt. Agricultural Research Center/Sidney
RESEARCHER: Joyce Eckhoff(Leader), Kristi Carda, Beverly Flynn, Jill Norby
AMOUNT FUNDED: \$3,000.00

OBJECTIVES: 1) To determine the effect on grain and straw protein content of dryland spring wheat when nitrogen is applied during tillering.
2) To determine economical nitrogen management programs for dryland spring wheat

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TITLE: Breeding for and selection of more drought resistant barley and spring wheat cultivars
INSTITUTION: Montana State University
DEPARTMENT: Plant & Soil Sciences
RESEARCHER: Eugene Hockett, Jack Martin, Luther Talbert, Hayden Ferguson
AMOUNT FUNDED: \$11,100.00

OBJECTIVES: 1) To adapt a new method of selection of drought resistant barley cultivars so it can easily be used by plant breeders.
2) To begin a genetic-breeding study leading to more drought resistant cultivars.

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TITLE: Cereal Quality Laboratory Equipment
Renovation/Acquisition

INSTITUTION: Montana State University

DEPARTMENT: Plant & Soil Sciences

RESEARCHER: Charles McGuire

COOPERATORS: Luther Talbert, Allan Taylor, Rick Zajdel, Tenny
Riggs

PERSONNEL: Shelley Messer & Collene Blankenship

AMOUNT FUNDED: \$27,137.00

OBJECTIVES: Repair and update cereal quality laboratory
equipment

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TITLE: Value enhancement of barley through coordinated
investigations of factors influencing nutritional
qualities and food science applications.

INSTITUTION: Montana State University

DEPARTMENT: Plant & Soil Sciences/Animal & Range Sciences

RESEARCHER: C.W. Newman
C.F. McGuire
R.K. Newman
M.K. Petersen
W. Hudyma

COOPERATORS: T.K. Blake, W.F. Gipp, E.A. Hockett, R.T.
Ramage(ARS USDA - University of Arizona)

AMOUNT FUNDED: \$90,000.00

OBJECTIVES:

1) To further characterize and develop commercial uses of barley
components which are responsible for the health benefits for
humans.

- a) Screen commercially available barley cultivars for their ability to suppress serum cholesterol
- b) Study the degree of polymerization (molecular weight) of barley b-glucans as influenced by the amylopectin:amylose ratio (waxy and nonwaxy barleys), the presence or absence of the hull and short and long awns as related to the effect on serum cholesterol and glucose levels.
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- a) Evaluate the effect of varying ratios of amylopectin:amylose (waxy and nonwaxy) barleys on the feed value of barley for animals.
- b) Investigate the influence of the proanthocyanidin (ANT) gene(s) on rate of digestion and subsequent feed value of barley for ruminants.
- c) Evaluate commercially released malt and feed type barley varieties for their potential as feed grains for ruminants.

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TITLE: Plant Pest and Integrated Services Identification

INSTITUTION: Montana State University

DEPARTMENT: Plant Pathology

RESEARCHER: Jack Reisselman

AMOUNT FUNDED: \$7,500.00

OBJECTIVES:

- 1) Develop Plant disease identification methods
- 2) Develop insect identification methods
- 3) Develop plant and weed identification methods

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TITLE: Trading with the world/Export Trade Manual

INSTITUTION: Montana State University

DEPARTMENT: Agricultural Economics

RESEARCHER: James E. Standaert, George Paul

AMOUNT FUNDED: \$16,000.00

OBJECTIVES:

- 1) To develop practical information on exporting opportunities for Montana processed and identify preserved grain products in selected countries.
- 2) To develop step by step procedures to aid current and potential exporters of Montana grain products through the export process
- 3) To provide workshop and individual consultation opportunities for grain producers, handlers and user to learn about export opportunities and the export process, including information on financing, government regulations, legal and tax considerations, tariffs and duties, documentation and marketing strategies, and partnership possibilities with foreign firms.

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TITLE: Spring Wheat Breeding and Genetics

INSTITUTION: Montana State University
DEPARTMENT: Plant & Soil Sciences
RESEARCHER: Luther Talbert
COOPERATORS: Charles McGuire, Al Scharen, Bernie Saltee, Alan Taylor, Tom Blake, Greg Johnson, Jack Martin, Howard Bowman, Don Baldrige, Research Center Personnel
PERSONNEL: Susan Lanning, Glenn Magyar, Mark McLendon
AMOUNT FUNDED: \$50,000.00

OBJECTIVES:

- 1) To develop spring wheat varieties for Montana
- 2) To manage the varietal testing program for spring wheat in Montana
- 3) To improve end -product quality of Montanan spring wheat
- 4) To improve our basic understanding of spring wheat breeding and genetics.

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TITLE: Winter Wheat Improvement
INSTITUTION: Montana State University
DEPARTMENT: Plant & Soil Sciences
RESEARCHER: Allan Taylor, Ted Kisha
COOPERATORS: MAES Research Center Faculty, Charles McGuire, Luther Talbert, Tom Blake, Jarvis Brown, Jack Martin, Hayden Ferguson, Victor Raboy, Dick Lund, Wendell Morrill, Grag Johnson, Cooperative Extension Service
AMOUNT FUNDED: \$50,000.00

OBJECTIVES:

1) Continue breeding winter wheat varieties which stabilize production and/or reduce grower production costs.

2) Support winter wheat breeding and research project

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TITLE: Biological control of russian wheat aphid

INSTITUTION: Montana State University

DEPARTMENT: Entomology

RESEARCHER: Jeff Littlefield, Robert Nowierski

AMOUNT FUNDED: \$75,500.00

OBJECTIVES:

1) Release and establish potential biological control agents against the russian wheat aphid and other cereal aphid pests

2) Initiate life table studies on the development, longevity and fecundity of cereal aphids and associated parasitoids.